AMERICAN MUSEUM NOVITATES

Number 480 | Published by THE AMERICAN MUSEUM OF NATURAL HISTORY New York City | July 14, 1931

59.57, 99 (51.2)

BEES OBTAINED BY PROFESSOR CLAUDE R. KELLOGG IN THE FOOCHOW DISTRICT, CHINA, WITH NEW RECORDS OF PHILIPPINE BOMBIDÆ

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Foochow or Fuchow, in southern China, is on the coast of the province of Fokien, a short distance north of the latitude of the northern end of Formosa. The Fokien Strait, about a hundred miles across, separates Formosa from the mainland. Owing to the industrious collecting of Sauter, the bees of Formosa are much better known than those of the adjacent mainland. Wallace, in his "Island Life," discusses the fauna of Formosa with special reference to the mammals and birds. He shows that in both groups the island possesses many endemic forms, and that these are frequently allied to species of remote regions, such as India, rather than with those of China. Thus he says of the birds: "This list exhibits to us the marvellous fact that more than half the peculiar species of Formosan birds have their nearest allies in such regions as the Himalayas, South India, the Malay Islands, or Japan, rather than in the adjacent parts of the Asiatic continent. Fourteen species have Himalayan allies, and six of these belong to genera which are unknown in China. One has its nearest ally in the Nilgherries, and five in the Malay Islands; and of these six, four belong to genera which are not Chinese. Two have their only near allies in Japan." The bees for the most part are closely allied to Chinese species, with the exception of certain species, such as *Andrena formosana* Cockerell, which must come from the mountains. The Formosan bee-fauna, as we know it, appears to be essentially a lowland fauna, and there can be little doubt that careful collecting in the high mountains (in the north reaching 12,000 feet) would produce a series of entirely new species. These would doubtless be found related to those of the Himalayas, the interior of China, or Japan. When we are trying to estimate the amount of divergence which has occurred since the separation of Formosa, it is necessary to consider the lowland fauna. The high mountains, prior to separation, were isolated from other similar ranges and must have had a largely endemic fauna. On the basis of the lowland fauna, Formosa, AS AN

ISLAND, does not impress us as being very ancient, and yet it is old enough to have produced a good many divergent types, and to be without rather numerous species which now abound on the adjacent mainland. For the student of Fokien bees, one of the most interesting problems is this comparison with Formosa, throwing light on the rate of divergence in different genera, and the former composition of the Fokien fauna. Indeed, what we find among the bees may readily be paralleled in other groups of insects. Take for example the butterfly *Papilio castor* Westwood: it has races in Sikkim (Himalayan Region), Assam, Burma, Siam, the Malay Peninsula, Hainan, and finally one (*formosanus* Rothschild) in the hills of Formosa. Among the bees, the races have not been so carefully studied as in the case of the butterflies, the material available being much less and the students very few. In several cases, we do not know whether the Formosan type is a race distinct from that of the mainland, good series from both regions being necessary. It is to be hoped that the coming years will see collectors of these insects in Asia, who will work with these interesting problems in mind, instead of merely collecting here and there with no definite purpose. It is unfortunate that there is no manual which describes the Chinese bees, but at present they are so little known that a synopsis of the recorded species would be extremely inadequate. There would be some utility in a compilation of the existing descriptions, like Mrs. Oldroyd's work on the Californian marine Mollusca, if any institution could be found willing to print it.

The bees recorded below, including the holotypes, are in The American Museum of Natural History.

MEGACHILE

Megachile faceta Bingham

One female. It has red tegulæ, as also is the case with *M. faceta* from near Shanghai.

Megachile faceta rufojugata, new subspecies

MALE.—Length, 11 mm.; parallel-sided, black, including mandibles, tegulæ and long antennæ; eyes very dark brown; head ordinary, cheeks broad, with a strong posterior margin; clypeus exposed, densely rugosopunctate all over, with a little shining spot in middle of upper end, lower margin unmodified, but from beneath it is a very conspicuous fringe of long white hair; sides of face and front covered with long bright fox-red hair; vertex densely rugose; cheeks strongly punctured, the punctures more or less running into grooves; thorax practically nude above, the mesothorax strongly punctured but shining between the punctures; scutellum convex, very densely rugosopunctate; area of metathorax moderately shining; a band of

bright fox-red hair across prothorax to and including tubercles; a large patch of white hair behind wings; wings dark fuliginous, pale at base; basal nervure arched, falling short of nervulus; second cubital cell long, receiving recurrent nervures equally far from base and apex; legs with thin pale hair; anterior coxæ with small dentiform projections, not to be called spines; anterior tarsi simple; abdomen shining and strongly punctured, without hair-bands except at sides, where rudiments of white bands appear, on fifth tergite more extensive, occupying the lateral thirds; sixth tergite with a depression above, the keel rounded and without teeth; hair of venter white.

Nearest to *M. faceta* Bingham, but distinguished by the black tegulæ and non-metallic abdomen. It is, I think, best regarded as a subspecies of *M. faceta*.

Megachile tsingtauensis Strand

One female in rather poor condition, agrees so nearly with Strand's description that I cannot undertake to separate it. It is hardly 11 mm. long (Strand says 12), but the abdomen is contracted, and the wing measurement agrees with Strand's. The hair of the thorax above, and especially the scutellum is clear bright fox-red, whereas Strand says dark brownish-yellow. The ventral scopa is shining silvery-white, black on the last two sternites; Strand says silver gray-whitish, black at end. The antennæ are entirely black, and the tegulæ are clear ferruginous. Considering the locality, it is very possible that this should be separated from Strand's *M. tsingtauensis*, but it would not be prudent to do this without more evidence. It is a species of tropical affinities, allied to *M. metallescens* Cockerell from the Philippine Islands, and *M. subignita* Cockerell from Singapore, but with wholly non-metallic abdomen, different mandibles, etc. According to Miss Sandhouse, the type of *M. robbii* Ashmead is really *M. metallescens*, and Ashmead's name has priority. Ashmead's description makes no reference to the metallic abdomen, and his account of the ventral scopa: "long and dense, and tinged with yellow," is not at all applicable.

Megachile takaoensis Cockerell

Both sexes of this species, originally described from Formosa.

Megachile bicolor caldwelli (Cockerell)

Both sexes. *M. bicolor kagiana* (Cockerell) was based on males from Formosa; the female, from the same island, was named *M. bicolor taiwana* Cockerell. Father Piel wrote me that when he was at the U. S. National Museum, he and Miss Sandhouse could not separate males of

M. caldwelli from those of *kagiana.* I was not then able to make any comment, having no male of *M. caldwelli.* This deficiency now being remedied, I have reviewed the matter, and conclude that *M. caldwelli* and *M. kagiana* are both races of the Indian *M. bicolor* (Fabricius), separable on the characters of the females, as previously described. The middle femora of the male *M. caldwelli* are entirely black, whereas in male *M. bicolor* (*M. fletcheri* Cockerell) they are red in front.

Megachile rixator Cockerell

A female in bad condition, and a male *M. aspernata* Cockerell, not quite typical. These names were based on Formosan material; Hedicke has claimed that *aspernata* is the male of *rixator,* and it must be said that the present material supports that opinion.

Megachile abluta Cockerell

One female. Described from Formosa.

Megachile conjuncta Smith

Both sexes of this well-defined species.

Megachile dinura Cockerell

Both sexes; rather smaller than the type (♀, 16.5–18.5 mm. long), with white bands on abdominal tergites two to five.

The following table separates the above species:

1.—Abdomen appearing red, from a covering of red hair.....2.
Black species with pale hair at base of abdomen and on hind part of thorax...5.
Small ordinary species with abdominal hair-bands.....9.
2.—Males.....3.
Females.....4.
3.—Anterior tarsi dark, simple; sixth tergite tricarinate.....*takaoensis* Cockerell.
Anterior tarsi pale, broadened; sixth tergite not tricarinate, but with a strong median projection above.....*bicolor caldwelli* (Cockerell).
4.—Clypeus depressed or chanelled in middle; mandibles above with a strong forked carina.....*bicolor caldwelli* (Cockerell).
Clypeus not depressed in middle; mandibles without such a carina. *takaoensis* Cockerell.
5.—Females.....6.
Males.....7.
6.—Mesothorax polished, abdomen metallic.....*conjuncta* Smith.
Mesothorax dull or rugose; large species.....*dinura* Cockerell.
Mesothorax very rugose; red hair about tubercles.....*faceta* Bingham.
7.—Clypeus all dull and granular; small species; tubercles with red hair. *faceta rufojugata* Cockerell.
Clypeus glistening; abdomen sub-metallic.....8.

8.—Hair at sides of thorax fulvescent; abdomen coarsely punctured. *dinura* Cockerell.
Hair at sides of thorax white..... *conjuncta* Smith.
9.—Male; anterior basitarsi with a red boat-shaped process. *rixator* Cockerell (*aspernata* Cockerell).
Females..... 10.
10.—Stigma very small, red; ventral scopa fulvous..... *rixator* Cockerell.
Stigma black or nearly so..... 11.
11.—Basal nervure almost meeting nervulus; a light band in scutello-mesothoracic suture..... *abluta* Cockerell.
Basal nervure falling far short of nervulus; scutellum with much red hair, and no hair-band in suture..... *tsingtauensis* Strand.

The female *M. faceta* is not conspicuously pale-haired at base of abdomen, and could perhaps better form a separate category at the beginning of the table.

Bombus

Bombus trifasciatus Smith

Six workers.

Bombus geei nigribasis, new subspecies

Almost exactly like *B. latissimus* Friese, from Formosa, but with the malar space conspicuously longer, as in *B. geei* Cockerell from Kuling, Kiangsi. The female is very robust, about 27 mm. long, the abdomen 12 mm. wide, and appearing wider on account of the outstanding hair. The female has the first two tergites black-haired, and the hair on the remaining ones deep rich red. In the worker, three tergites are black-haired. (In female *latissimus* the first tergite and often more or less of the second are black-haired, the rest red-haired. The wings are yellowish hyaline, with an apical dusky margin not reaching the cells. Mandibles of female strongly tricarinate on outer side; quadridentate, the inner two teeth small; third antennal joint about one and a third longer than fourth; no trace of yellow hair at sides of base of abdomen in female or worker; middle and hind tibiæ and tarsi dark red, with bright red hair. There is a very close resemblance to *B. discrepans* Pendelbury, from peninsular Siam, but that has the hind basitarsus long and very much narrower. *B. ignitus* Smith, from Japan, also may be compared, but has black hair on middle and hind legs.

One female (type) and twelve workers.

The type of *B. geei* is stated to be a female, but I think it is a large worker. In one *nigribasis* worker the hair at end of abdomen is fulvous rather than red, and there is a little fulvescent hair along apical margin of first tergite. There is also a worker with much white hair in middle of scutellum, and the hair of middle and hind tibiæ pallid. In this specimen only the first two tergites are black-haired. I believe that these differences are only varietal. Friese found the Formosan *B. latissimus* so variable in color that he described and named three varieties.

Bombus rufocognitus, variety **nefandus,** new variety

Female (type) and workers with hair of apical part of abdomen all black. The wings are fuliginous and the thorax has rich ferruginous hair, with a black band between wings. The first two tergites have pale yellow hairs. The typical *B. rufocognitus* is from Suifu, Szechwan.

The above species may be separated by the following table:

1.—Hair of thorax above all black.....*geei nigribasis* Cockerell.
Hair of thorax above light, with a black band between wings.....2.
2.—Light hair of thorax yellow.....*trifasciatus* Smith.
Light hair of thorax ferruginous.....*rufocognitus nefandus* Cockerell.[1]

ANTHOPHORA

Anthophora dulcifera Cockerell

Both sexes, the male being new. The female was described from Keeling, China. The Foochow females differ by the hair of the thorax above being pale fulvous profusely mixed with black, hence not nearly so bright as in the type. The abdominal bands are bright bluish-green,

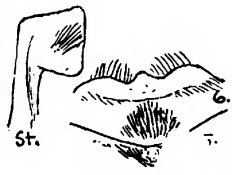

Fig. 1.

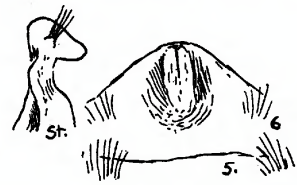

Fig. 2.

Fig. 1. *Anthophora dulcifera* Cockerell. Foochow district, China.
Fig. 2. *Anthophora zonata* (Linnæus). Takao, Formosa.

shining. The male is extremely like that of *A. zonata* (Linnæus), as I have it from Formosa, but is larger and more robust, with brighter colored bands, while the clypeus is conspicuously longer, and the lateral black marks come to a point above, instead of broadening to the upper edge of clypeus. The face is creamy white, not at all distinctly yellow.

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[1]While on Oriental *Bombus*, I take the opportunity to record some material from the Island of Luzon, Philippine Islands. *B. mearnsi* Ashmead comes from Irisan, Benguet (McGregor), *B. irisanensis* Cockerell from Imugan (McGregor), Bontoc (Francisco Rivera), Zamboales Mts., Tapolao (McGregor), and Balite Pass, N. V. (McGregor). *B. baguionensis* (Cockerell) is from Benguet (McGregor) and Bontoc (Rivera). These Philippine *Bombus* are little related to those of China and Formosa. *B. irisanensis* belongs to Frison's subgenus *Senexibombus*, otherwise known from Sumatra and Borneo. *B. baguionensis*, however, is referred by Frison to the holarctic subgenus *Pratobombus*, and appears to have no relatives in Java, Sumatra, or Borneo. *Pratobombus* does occur (e.g., *B. flavescens* Smith in Chusan) in China, but so far as I know there is no species closely resembling that of the Philippines. The male of *B. mearnsi* is unknown, and Frison does not undertake to place the subspecies generically; but it certainly shows resemblance to the group of *B. rufipes* Lepeltier (*Rufipedibombus* Skor.), which occurs in Java and Sumatra, but also in China and India. Although it is not much over 200 miles from Formosa to Luzon, and there are small islands between, the Philippine bee-fauna appears to be derived from other than Chinese or Formosan sources.

That *A. dulcifera* is really quite distinct from the Formosan *A. zonata* is shown by the fifth and sixth sternites, and the stipites, illustrated herewith. It is probably nearer to the Indian *A. cingulifera* Cockerell, and especially to **A. doveri**, new name (*A. walkeri nigritarsis* Dover, 1924, not *A. nigritarsis* Friese), which has quite the same sort of stipites. It agrees with *A. doveri* also in the black-haired hind basitarsi, but the white hair of hind tibiæ is not mixed with black, and the thoracic hair is quite different. My Formosa *A. zonata* agrees in the stipites with that species as illustrated by Dover (Entomologist, October, 1924). The seventh ventral plate of *A. dulcifera* is closely similar to that of *A. doveri*, not like that of *A. zonata*.

There is a possibility that the Foochow *A. dulcifera* are racially separable from the type, but it would take a good series from each place to prove it, and the color variation is such as we often see in *Anthophora*.

Habropoda

Habropoda tainanicola (Strand)

The single female sent is in very bad condition, but it appears to belong to Strand's species, described from Formosa. It is very distinct by the entirely black face; the dark reddish labrum keeled down the middle and sharply bidentate at end; the large red area on basal part of mandibles; brownish-black hair of head and thorax (but cheeks below with long gray hair); dark tegulæ; yellowish-hyaline wings; hind tibiæ and tarsi covered with very bright ferruginous hair; apex of abdomen with red hair. If this is at all different from the Formosan insect, the fact can only be ascertained by direct comparison of good specimens.

Crocisa

Crocisa amata Cockerell

Two males. The species was described from Formosa. The Chinese form seems a little different, but not sufficiently so to deserve a subspecific name, at least until a good series can be studied. The hind femora of the male have a large tooth beneath.

Crocisa surda Cockerell

Two females. The species was described from Foochow (Caldwell).